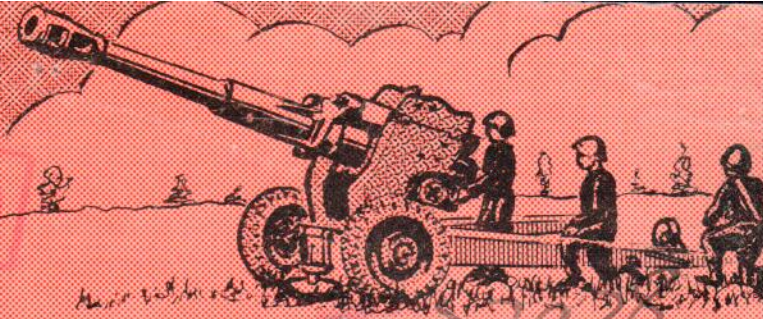


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ARMY TECHNICAL INTELLIGENCE REVIEW

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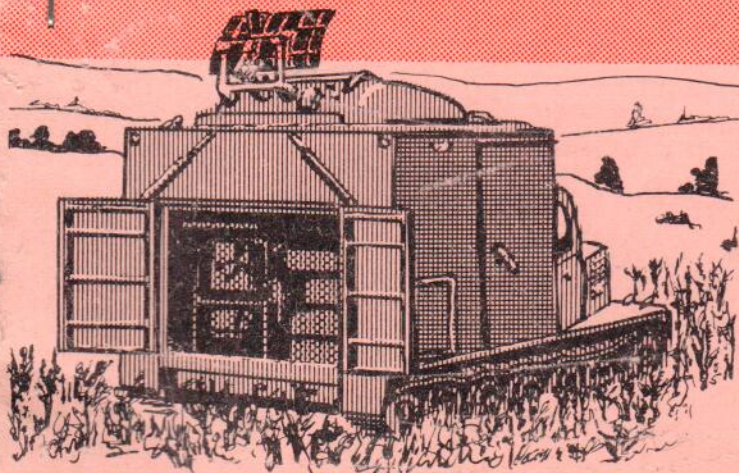
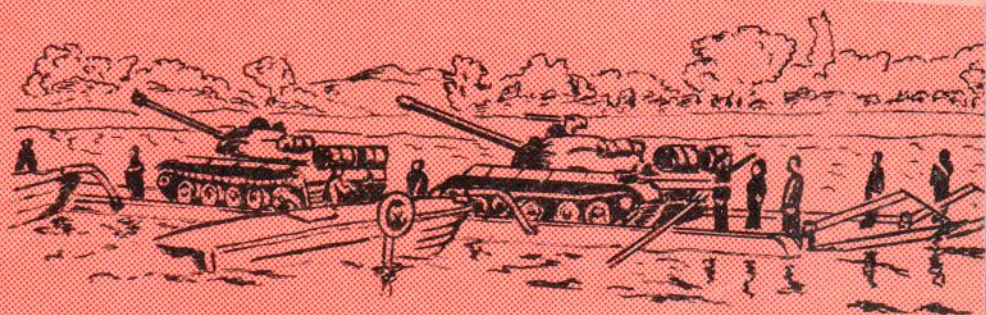


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JULY 1971



No 99

ARMY TECHNICAL INTELLIGENCE REVIEW No 99 (SECRET)

JULY 1971

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SECRET
AUSCANUKUS

ARMY TECHNICAL INTELLIGENCE REVIEW No 99 (SECRET)

FOREWORD

LAST January we referred to the growing importance of China in the Technical Intelligence field. In this issue we continue our coverage of CHICOM weapons and equipment with articles on the CHICOM 7.62 mm Carbine and CHICOM MT. China continues to give military aid wherever she sees the possibility of political advantage accruing, particularly if this can be gained at the expense of the Comrades in Soviet Russia. Collectors world wide should therefore be on the lookout for any new items of equipment which could appear from this Source.

There are two Staff changes to report. Major Stanley Ball leaves us this month on promotion to command a regiment. His place at the MT and C/B Ops desks will be taken by Major Norman Fincham. Major Sam Dunbar vacates the Engineer desk in early August and returns to Canada to do a job in DOD, Ottawa. He hands over to a fellow Canadian Sapper, Major Ian Ballantyne, who comes to us from the same headquarters.



S C SMITH
Colonel
Tech Int (A)

Corrigendum
ATIR No 98

Page 29 Article 18, amend classification to read AUSCANUKNZUS

1. New Modifications to the BMP (SECRET)

In this SECRET ATIR we think it important to bring our readers up to date on recent modifications to the new Soviet APC the BMP.

The BMP was first seen in the Moscow Parade of 7 November 1967. In 1968 some exterior modifications were made. These included the re-arrangement of some vehicle lights, enlargement of the forward firing port and a reduction in the number of vanes at the rear of each track guard.

Some major modifications appeared in the November 1970 Parade, a summary of these are as follows:-

1. Variation in some of the overall dimensions, including lengthened hull and sharper front Glacis angle (details of these can be seen in Table 1 (Fig 1) and Fig 2.

Fig 1. BMP - DETAILS OF MODIFICATIONS

	1970 VERSION		1967 VERSION	
Road wheel Diameter	24.6 in	625 mm	24.6 in	625 mm
O/A length	22.14 ft	6750 mm	21.4 ft	6525 mm
Front slope	4.6 ft	1397 mm	3.5 ft	1066 mm
Height to top of turret (including hatches)	6.68 ft	2032 mm	6.3 ft	1921 mm
Height to tip of front slope	4.02 ft	1225 mm	3.96 ft	1206 mm
Ground contact	11.9 ft	3690 mm	11.9 ft	3690 mm
Approx slope of upper front plate	83° to vertical		80° to vertical	
Approx slope of bottom front plate	61° to vertical		52° to vertical	

New Modifications to the BMP (cont'd)

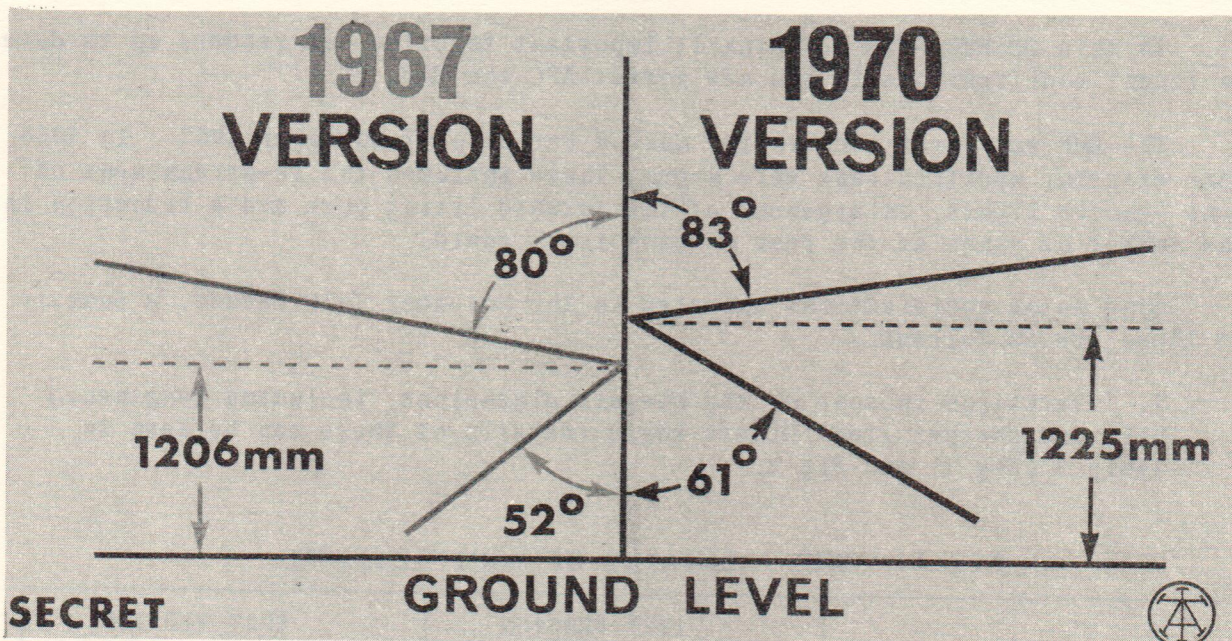


Fig 2. Modifications to Front Glacis Plate

2. Some re-designed Firing Ports
3. Re-designed Infantry Compartment Hatches
4. A new Ventilator for the Infantry Compartment

The majority of these changes can be seen in this series of photographs.



Fig 3. 1967 BMP (Short Hull Version)

New Modifications to the BMP (cont'd)

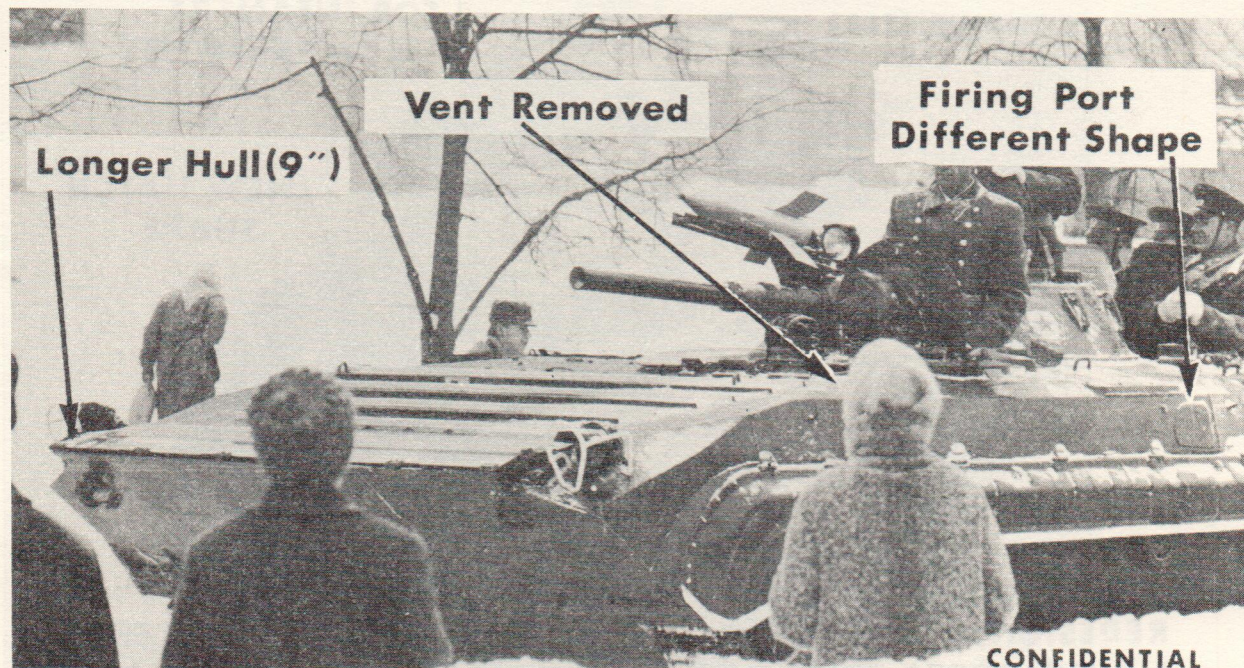


Fig 4. 1970 BMP (Long Hull Version)

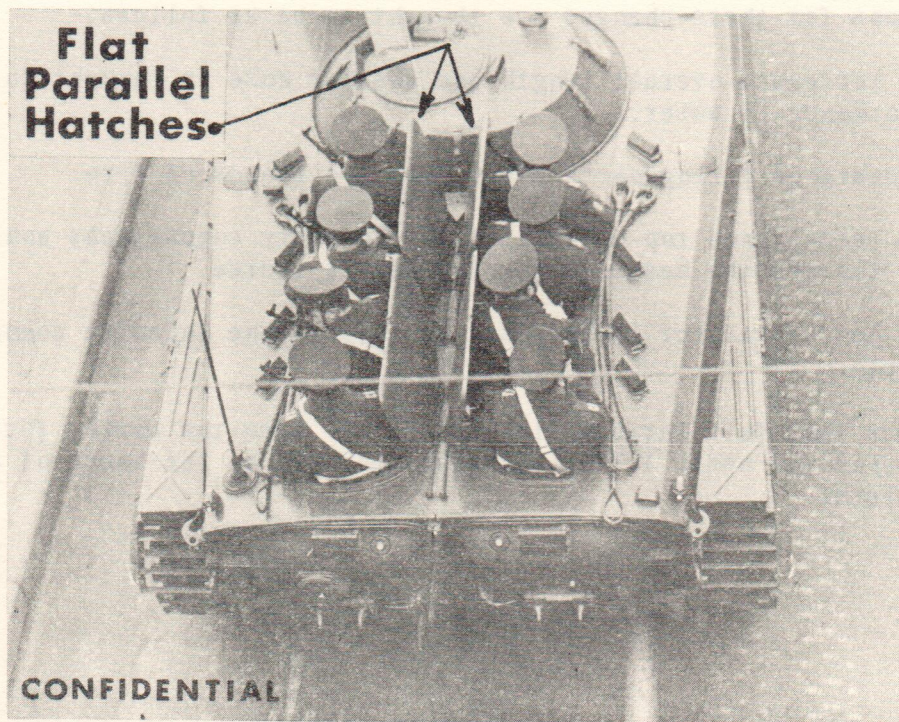


Fig 5. 1967 BMP (Short Hull Version)

New Modifications to the BMP (cont'd)

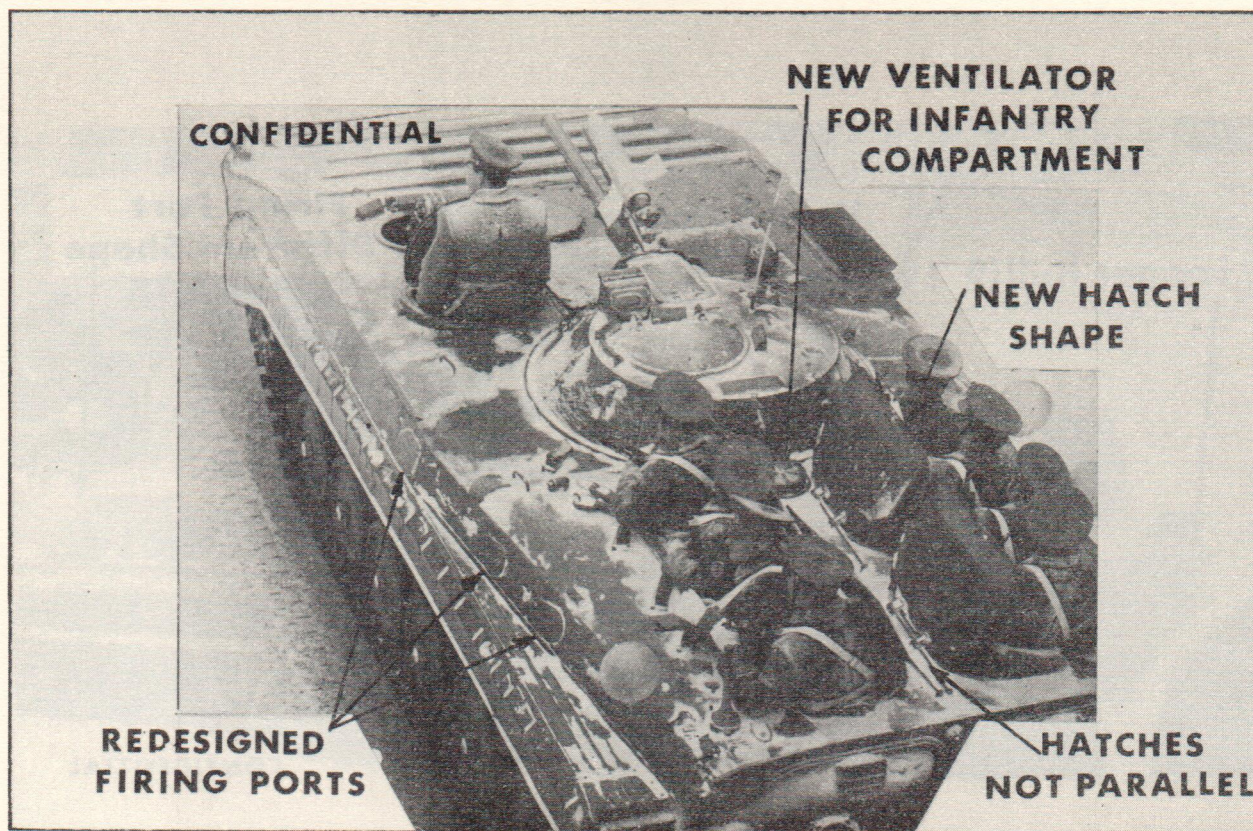


Fig 6. 1970 BMP (Long Hull Version)

The reasons for these changes are thought to be as follows:-

1. The increased overall length and sharper nose is thought to improve its performance in water.
2. Re-designed firing ports are to improve fields of fire.
3. The re-designed top hatches of the infantry compartment would probably improve the headroom for the people inside.
4. The new ventilator is included to improve the infantry compartment ventilation.

We believe that full introduction of the BMP into the Soviet forces will take place during the early 1970s, and that it could be the basis of a new family of vehicles.

2. CHICOM 7.62 mm Carbine Type 68(?) (SECRET)

In the June and August 1970 editions of CHINA PICTORIAL, pictures appeared of soldiers holding a previously unseen rifle which has been given the provisional nomenclature CHICOM 7.62 mm Carbine Type 68(?)

At first glance this weapon resembles the CHICOM 7.62 mm Carbine Type 56, but there are several major differences.

- a. The weapon uses CHICOM Type 56 Assault Rifle 30 rd magazine in place of the original 10 rd magazine.
- b. The receiver of the new rifle is longer than the old.
- c. The rear sight has been re-located from in front of the receiver, to a position on the bolt cover.
- d. The hand guard has two large openings and appears to have been shortened.
- e. A spike bayonet has been fitted.

This rifle is assumed to fire the CHICOM 7.62 mm M43 cartridge, possibly be capable of selective fire, weigh approx 10 lbs loaded and have an effective range of 400 m.

RESTD



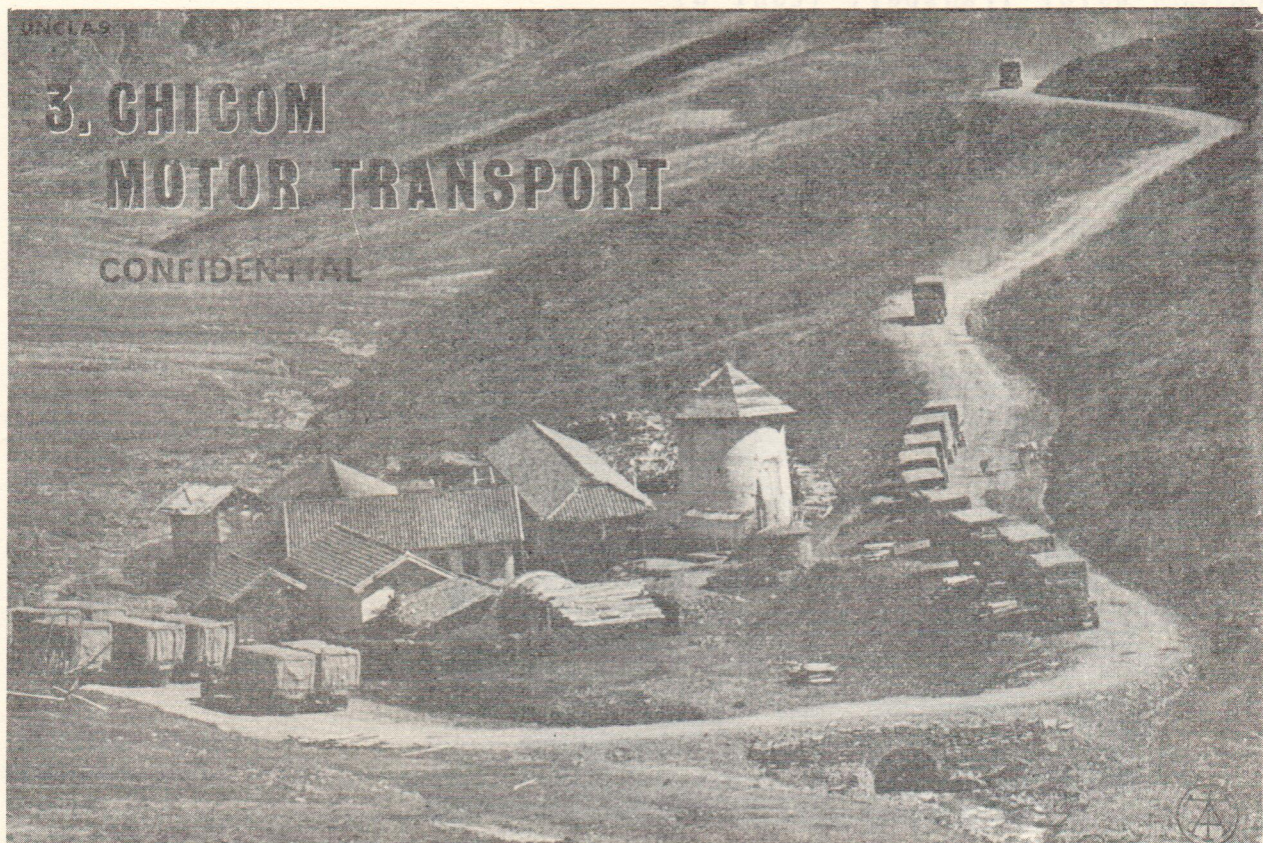
Fig 1. Artists impression of CHICOM 7.62 mm Carbine Type 68(?)

CHICOM 7.62 mm Carbine Type 68(?) (cont'd)

UNCLAS



Fig 2. CHICOM 7.62 mm Carbine Type 68(?)

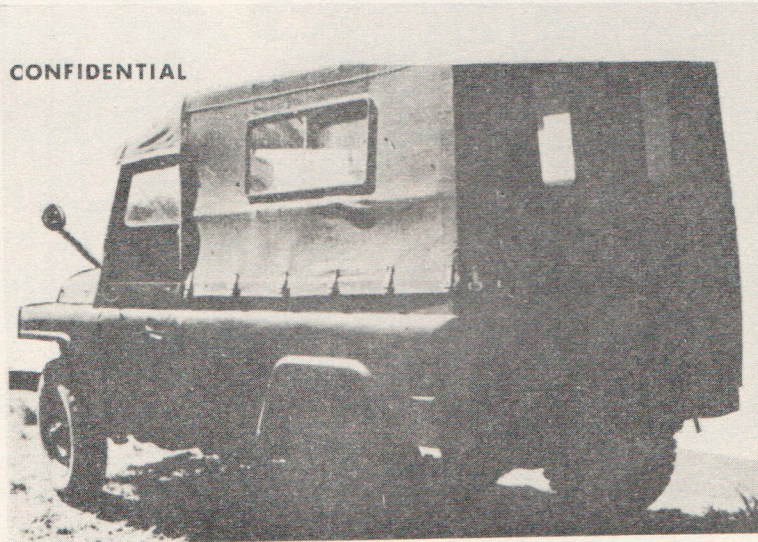


In the late 1950s during the "Great Leap Forward" China began to produce her own motor vehicles. These were almost wholly based on spare parts and components imported from the USSR and the problem was primarily a question of assembly. With the break between China and the USSR the position changed radically. Vehicles, which have always been in short supply in China, were even more urgently required to assist China to become an independent modern industrialised country. Production proliferated and vehicle nomenclatures and specifications have appeared by the score. The vast majority of these vehicle types never got beyond prototype or possibly pre-production runs.

This complex situation has led to a certain confusion as to what vehicles are in production in China currently. These then are the vehicles that we accept as being in regular production and of some military significance.

CHICOM Motor Transport (cont'd)

BJ-212. This Chinese Jeep has been known since 1965 and appears to be in fairly steady production. Two versions exist - a two door and a four door model somewhat akin to the Soviet GAZ-69 and GAZ-69A respectively. Both versions are fitted with towing hooks front and rear and full weather protection. They have been seen as weapons carriers mounting the Chinese 12 rocket 107 mm multiple rocket launcher, Type 63.



**Fig 1. BJ-212
2 Door Model**

**Fig 2. BJ-212
4 Door Model
Mounting 107 mm
Rocket Launcher
Type 63**



Technical Characteristics (BJ-212)

Pay Load	425 kg	¼ T
Drive	4 x 4	
Engine	a. 4 cylinder petrol b. 75 BHP at 3,500 rpm	
Top Speed	98 kph	60 mph
Length	3,860 mm	12.78 feet
Width	1,750 mm	5.74 feet

CHICOM Motor Transport (cont'd)

CA-10. This is the basic Chinese vehicle and is in wide service with both the civil transport communes and the armed forces. It is the principal load carrier for the CCA. It is based on the Soviet ZIL-150 which in turn is based on a US FORD design of the 1940s. The CA-10 has been exported. There are several variants of this truck; such an example is the CA-40 dump truck.

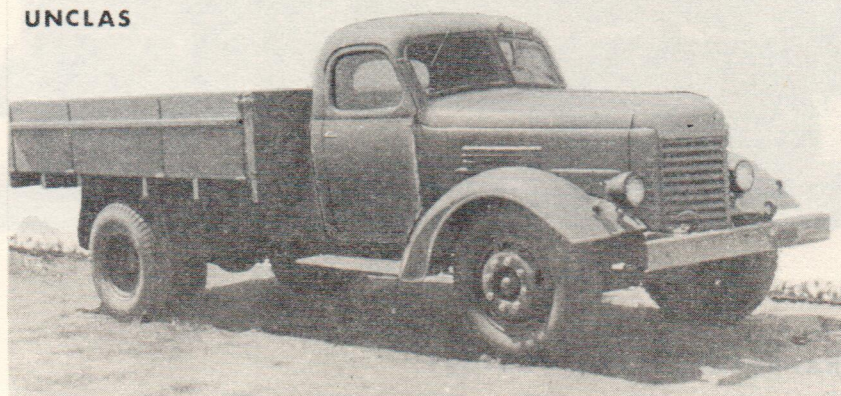


Fig 3. CA-10 Truck

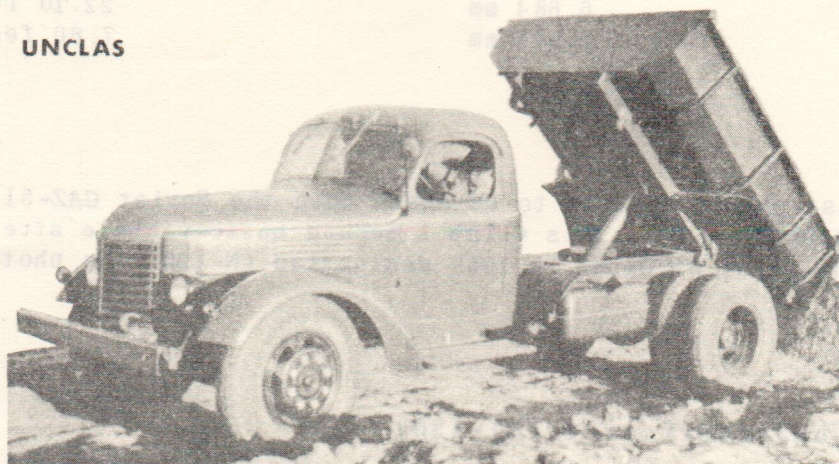


Fig 4. CA-40. Dump Truck Version of CA-10

Technical Characteristics (CA-10)

Pay Load	4,000 kg	4 T
Drive	4 x 2	
Engine	a. 6 cylinder petrol b. 95 bhp at 2,800 rpm	
Top Speed	75 kph	46 mph
Length	6,660 mm	22.0 feet
Width	2,460 mm	8.1 feet

CHICOM Motor Transport (cont'd)

CA-30 This all-wheel drive truck is based on the Soviet ZIL-157 with minor differences to the body work. Several versions are known - some with full width body work. Production of this vehicle has been slow but even so, some CA-30s have been exported.

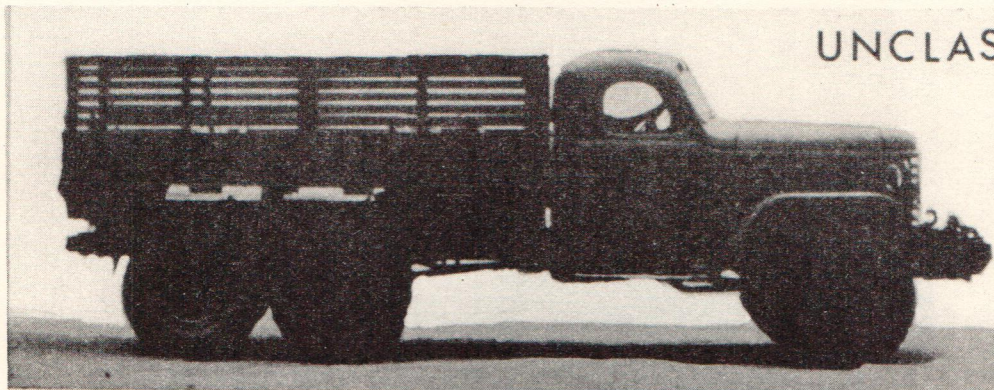


Fig 5. CA-30 Truck

Technical Characteristics (CA-30)

Pay Load	2,500 kg	2½ T
Drive	6 x 6	
Engine	a. 6 cylinder petrol b. 95 bhp at 2,800 rpm	
Top Speed	75 kph	46 mph
Length	6,684 mm	22.10 feet
Width	2,315 mm	7.60 feet

NJ-130 This vehicle appears to be based upon the Soviet GAZ-51. Sufficient have been produced to make this China's second basic vehicle after the CA-10. It was first produced in 1958 designated CN-130. No photograph is available.

Technical Characteristics (NJ-130)

Pay Load	2,500 kg	2½ T
Drive	4 x 2	
Engine	a. 6 cylinder petrol b. 70 bhp at 2,800 rpm	
Top Speed	70 kph	43 mph
Length	5,725 mm	18.95 feet
Width	2,280 mm	7.52 feet

CHICOM Motor Transport (cont' d)

NJ-230 This 4-wheel drive truck is produced in small numbers for military use. It is based on the Soviet GAZ-63 and was in use by 1965/66. It is possible that it is a re-designation of the CN-320 first made in 1958.



Fig 6. NJ-230 Truck

Technical Characteristics (NJ-230)

Cross Country Pay Load	2,000 kg	2 T
Drive	4 x 4	
Engine	a. 6 cylinder petrol b. 70 bhp at 2,800 rpm	
Top Speed	65 kph	40 mph
Length	5,800 mm	19.18 feet
Width	2,200 mm	7.23 feet

JN-150 This is one of the biggest of the Chinese trucks that is in production. It was developed in 1961 and in regular production by 1964. It is very similar to the Czech SKODA-706 RT.



Fig 7. JN-150 Truck

Technical Characteristics (JN-150)

Pay Load	8,000 kg	8 T
Drive	4 x 2	
Engine	a. 6 cylinder diesel b. 160 bhp at 1,800 rpm	
Top Speed	70 kph	43 mph
Length	7,600 mm	25.2 feet
Width	2,400 mm	7.90 feet

CHICOM Motor Transport (cont'd)

Quarry Trucks. In addition to these vehicles a 25 ton and a 32 ton quarry truck are believed to be in production. The 25 ton truck is a copy of the MAZ-525 and the 32 ton truck appears to be a composite of several Western vehicles.

UNCLAS



**Fig 8. RED CRAG
25 ton Dump Truck**

UNCLAS



**Fig 9.
32 ton Dump Truck**

Conclusion. There is still a dire shortage of motor transport in China for both civil and military purposes. The present total holding of trucks is probably only in the region of 300,000.

4.Czech Explosive Mine Clearance Devices (SECRET)

ATIR 93 of April 1969 contained an article on a rocket projected explosive mine clearance device, Code-named PRUNA, which reputedly was under development by Czechoslovakia for use by all Bloc Forces. Since that time numerous reports have been received confirming this existence of such a device but containing conflicting detail on its method of construction, operation, transport and effect. Recently a parade was held in Magdeburg in East Germany to mark the end of the Warsaw Pact Exercise Waffenbruderschaft and the Czech Forces displayed the equipment shown in Figure 1. This we now believe is the elusive PRUNA and sharp-eyed, elephant-minded readers will recognize this as an item reported in ATIR 87 of October 1967 as a Czech Amphibious Trailer.

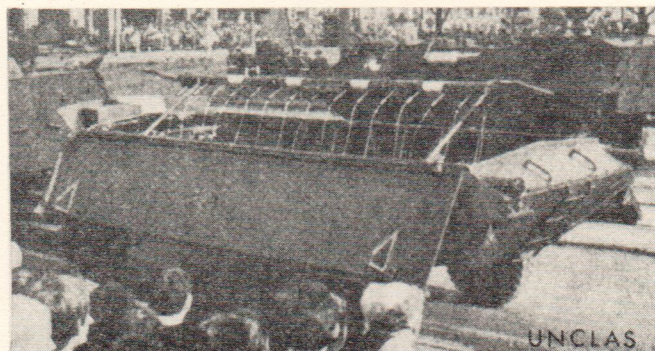


Fig 1. Czech Mine Clearance Device (PRUNA?)

Although hard intelligence is still lacking on many aspects of this equipment, we have made some tentative assessments based on all available evidence. In Figure 1 the trailer is shown with its hatches open revealing the device in the raised, firing position, however the propelling rockets which should normally be fitted to the ends of the tow bar are not evident. Fifteen explosive streamers can be seen trailing from the tow bar to the inside of the trailer where they are presumably on some sort of dispensing spools and the device should fire at right angles to the direction of travel of the trailer to clear a gap 100 metres in length and five metres in width. There is also some evidence to suggest that the equipment can be fired from the water (ie that the trailer is indeed amphibious) to clear a minefield on the farside of a water obstacle.

The Czechs also may have developed two other explosive clearance devices. The first, Code named ODMIRA, is similar to PRUNA but designed to clear gaps for foot-soldiers and is therefore smaller in size than PRUNA. The second is thought to be an explosive train towed behind a mine plough equipped tank and which, when detonated, destroys mines in the uncleared area between the plough blades. We have not yet received photographs of these equipments.

All of the devices are of continuing priority interest and we would welcome any information or suggestion from collectors and analysts alike.

5. New Soviet VHF Radio Relay Antenna CATS PAW (SECRET)

During 1970 a new directional VHF antenna was sighted in BLOC countries which is of a design which is not yet recognised in this country. This has been given the nickname "CATS PAW".

It was first seen in Czechoslovakia in April 1970, but has since also appeared in E Germany, USSR, Poland and Hungary. It is seen associated with military vehicles in a tactical environment and also seen in static sites.

It consists of a rectangular reflector on one side of which is mounted four 'bow-tie' like devices on short pillars. On the other side, two square shapes are mounted corner to corner. See artist's impression at Figure 1, which is not to scale. A worm's eye view of the antenna is shown in Figure 2, and it should be noted that the antenna can be mounted either horizontally as in Figure 1, or vertically as in Figure 2. This is normal radio relay technique used to minimise mutual interference when two or more antennae are erected at one site.

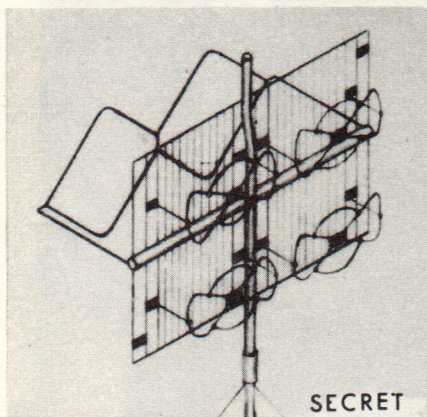


Fig 1. Artist's Impression

CATS PAW

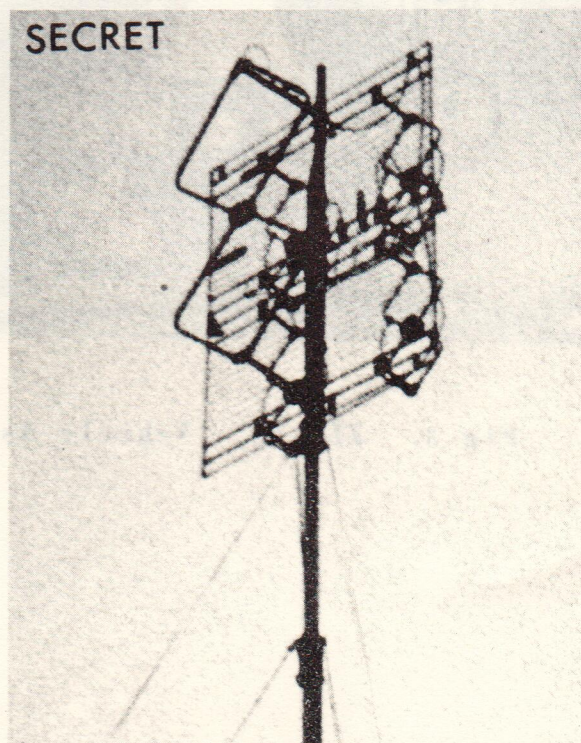


Fig 2. Worm's Eye View

New Soviet VHF Radio Relay Antenna CATS PAW (cont' d)

. In tactical sightings this antenna is seen erected alongside a ZIL 157 of a type shown in figure 3. (USAREUR No 299). This vehicle was first seen in E Germany in April 70 and has also recently been seen in Czechoslovakia, but here CATS PAW has also been seen erected next to a PRAGA V3S vehicle.

. The antenna is thought to be a wide band high VHF directional device. From its tactical sightings it is almost certainly connected to a radio relay equipment, and this would also fit in with its location in static sites.



Fig 3. ZIL-157 Vehicle Associated with CATS PAW

6. New Soviet VHF Radio Relay Antenna CATS EYE (SECRET AUSCANUKUS)

This antenna was first seen in E Germany in August 1970 but has also appeared in static sites in USSR (Figure 1). It consists of a rectangular reflector, on one side of which is mounted two oval shapes, part of which is filled in. It has also been seen in the hands (literally) of the E German Army as shown in the photo from the newspaper VOLKSARMEE (Figure 2). In GSFG it has been seen deployed next to a ZIL-157 (USAREUR No 320). Note that CATS EYE can also be mounted horizontally or vertically.

This antenna is also thought to be a wide band high VHF directional device, probably used for radio relay links. It has been given the nickname 'CATS EYE'.



Fig 1. Static Site

CATS EYE



Fig 2. Being used by
East German Army in
Portable Role

7. New Soviet VHF Direction Finding System SPIKE SQUARE (SECRET AUSCANUKUS)

In September 1969, a new Soviet VHF Direction Finding device was first seen in E Germany. It consists of four H antennae mounted to form a square on a mast erected on the roof of a ZIL 157 (USAREUR No 312). The dimensions of the antenna indicate that 70 MHz is approximately the top end of its operating range, and it should be assumed that it probably effectively covers most of the VHF frequencies used for single channel radio by NATO Armies. It has been nicknamed SPIKE SQUARE, and it probably represents a considerable advance in accuracy and possibly sensitivity over SPIKE TWO which only had a single H antenna mounted on a two wheeled box bodied trailer.

A photo of the antenna erected is shewn at Figure 1. It has always been seen with the antenna square to the vehicle, and it is assumed that steering is carried out by electrical means. When stowed for transit the mast folds into two sections which remain flat on the roof (see Figure 2). This may then be protected by a cover. Note the distinctive struts on the angle of the chamfered roof which are used to secure the platform on the roof. If the antenna is to be stowed with the elements still attached to the mast, they are collapsed flat onto the roof and two brackets hinged on the front and rear edges of the roof platform are raised up; a box like canvas cover is then used to protect the whole structure and gives the appearance shewn in Figure 3.

SPIKE SQUARE has very recently been seen in Hungary and it may well spread further as it undoubtedly improves the VHF Direction Finding capability of the Warsaw Pact Armies.

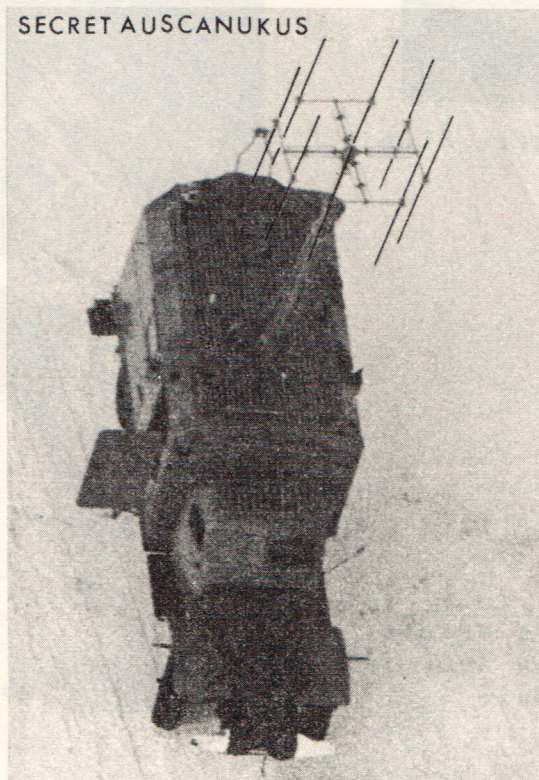


Fig 1. SPIKE SQUARE Mounted on ZIL-157

New Soviet VHF Direction Finding System SPIKE SQUARE (cont' d)

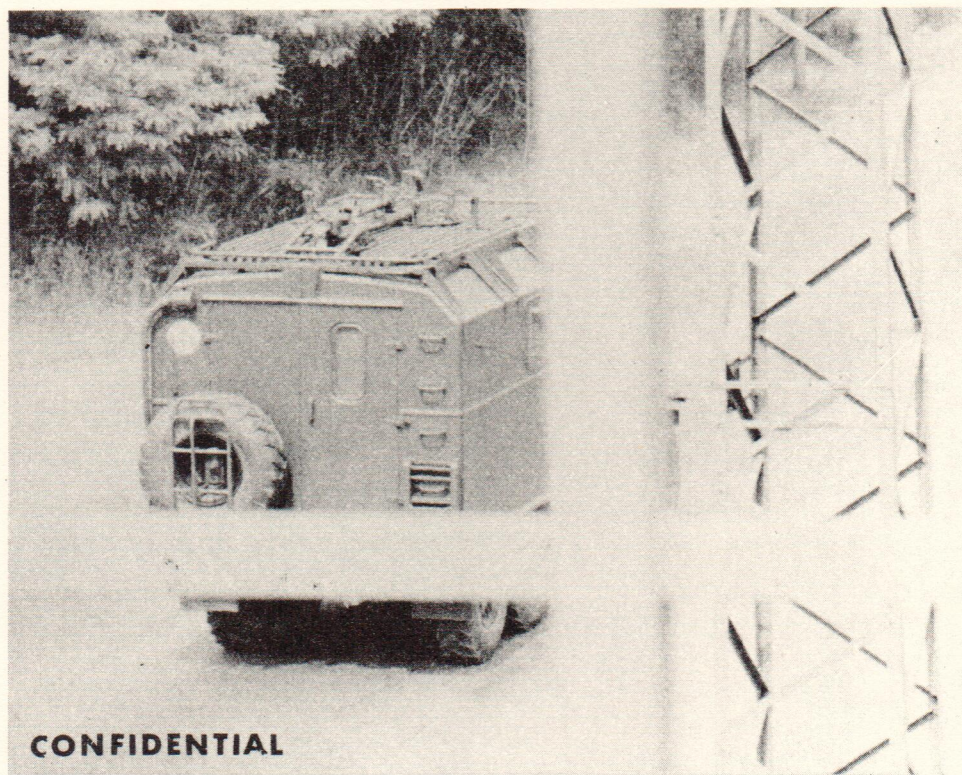


Fig 2. SPIKE SQUARE Mast Folded Flat

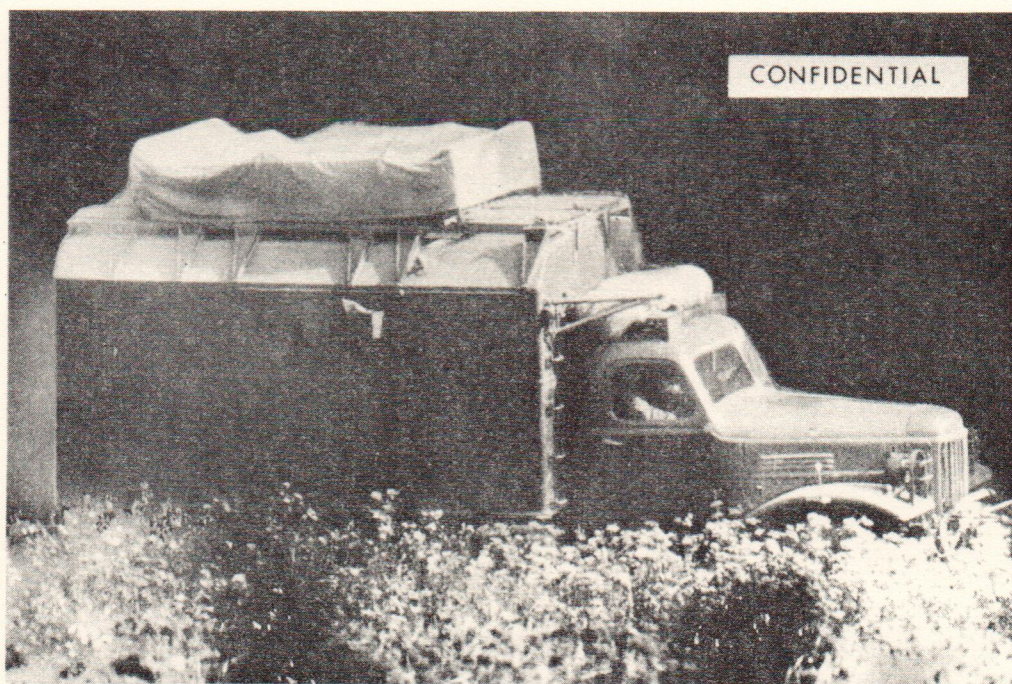


Fig 3. SPIKE SQUARE Mast and Elements under Canvas Cover

New Soviet VHF Direction Finding System SPIKE SQUARE (cont'd)



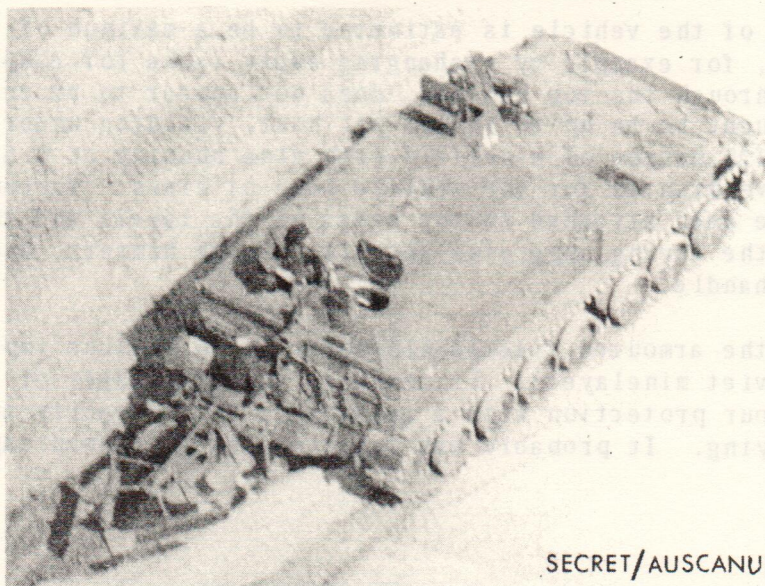
Fig 2. SPIKE SQUARE Mast Folded Flat



Fig 3. SPIKE SQUARE Mast and Elements under Canvas Cover

8. Soviet Armoured Tracked Minelayer (SECRET AUSCANUKUS)

The latest Soviet mechanical minelayer to appear, the armoured tracked minelayer, has been described in previous ATIRs (Nos 95 & 98) and we now have obtained more photographic coverage of it which gives better views of the laying apparatus (Figure 1) and of the interior of the body (Figure 2). From these we have been able to do a little more detailed analysis of its method of operation and capability although we have yet to see it in actual operation and therefore cannot give firm performance figures.



SECRET/AUSCANUKUS

Fig 1. Armoured Tracked Minelayer (View of Laying Apparatus)



Fig 2. Armoured Tracked Minelayer (showing interior)

The equipment operates with a crew of four; a crew commander, driver, controller of the laying apparatus, and loader. The crew commander and driver carry out their functions from the two hatches near the front of the vehicle and have infra searchlights to assist in night operation. The controller of the laying apparatus sits in the hatch in the rear and from there controls the

Soviet Armoured Tracked Minelayer (cont'd)

hydraulic raising and lowering of the equipment, the selection of surface or buried modes, and the spacing of mines. He also has a searchlight to assist in night work, but this is probably white light. The loader works inside the vehicle taking mines from the racks, which can be seen in Figure 2, removing the safety pin, and loading them into a chute for feeding into the laying apparatus. In this regard it should be noted that modern Soviet Anti-Tank mines probably all have an arming delay such as the 30 second delay in the fuze of the TM-57 Anti-Tank mine.

The capacity of the vehicle is estimated to be a maximum of 150 mines. rapid re-loading, for example by exchanging empty racks for complete loaded racks by crane through the top hatches, does not appear to be feasible. Speed of laying is thought to be up to 10 kms per hour, yielding under ideal conditions some 825 metres of minefield, with mine spacing of 5.5 metres, in approximately five minutes for one vehicle load of mines. Various ancillary equipments can be seen attached to the sides of the layers and these include spare parts for the laying apparatus, shovels, sledge hammers, and perhaps even a starting handle.

In summary, the armoured tracked minelayer is an obvious improvement over previous Soviet minelayers. It combines the advantages of track mobility and armour protection with a reasonable mine capacity and some automation of laying. It probably has deficiencies in reload capability.

9. THE SAGGER ANTI-TANK MISSILE FAMILY

THE SAGGER ANTI TANK MISSILE FAMILY

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THE SAGGER ANTI TANK MISSILE FAMILY

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THE SAGGER ANTI-TANK MISSILE FAMILY

INTRODUCTION

1. In 1965 the Soviets paraded a small Anti-Tank Guided Weapon to replace their existing wire guided missile SNAPPER. This new missile, NATO nickname SAGGER, proved itself highly successful in Soviet eyes and several hundreds of thousands will have been produced during its service life.
2. It is now the basic ATGW of the Warsaw Pact armies and satellites, some of whom produce their own copies in quantity under licence, and has been incorporated in several anti-armour systems.
3. In many respects Soviet designers have repeated the success story of the French SS11.

Systems Employing SAGGER Missiles

4. The SAGGER Missile is found on the following systems
 - a. BRDM Mounted SAGGER Anti Tank System
 - b. Man Portable SAGGER Anti Tank System
 - c. Czechoslovak OT64 SAGGER Carrier/Launcher System
 - d. Soviet BMP
 - e. Soviet T-62 Medium Tank (suspected optional fit)
 - f. Yugoslav AR 51 (carrier only)

Helicopter Firings

5. In addition, SAGGER firings from helicopters have been reported from Warsaw Pact annual exercises. Although this is believed to be more a political demonstration than a new weapon system, it indicates that the Soviets are keeping abreast of the necessary techniques.

Data Sheets

6. Data sheets for the main systems can be found at the end of this article.

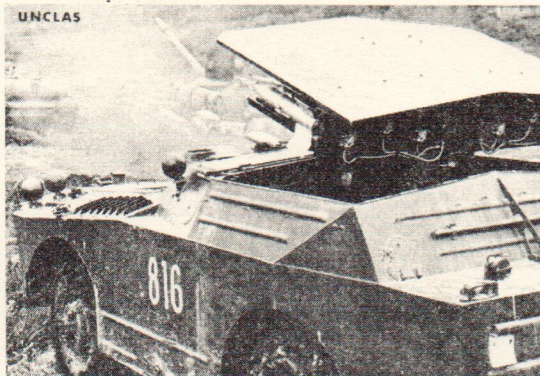


Fig 1. BRDM Mounted SAGGER
Anti Tank System

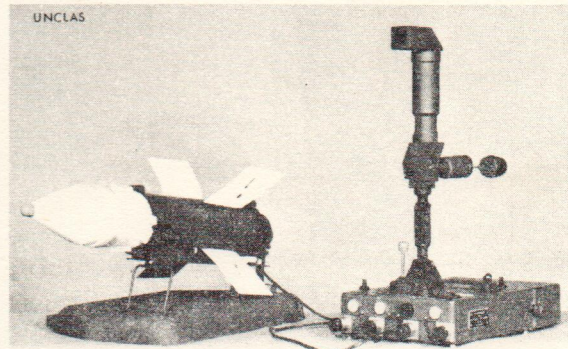


Fig 2. Man Portable SAGGER
Anti Tank System



**Fig 3. Yugoslav AR-51
(Carrier only)**

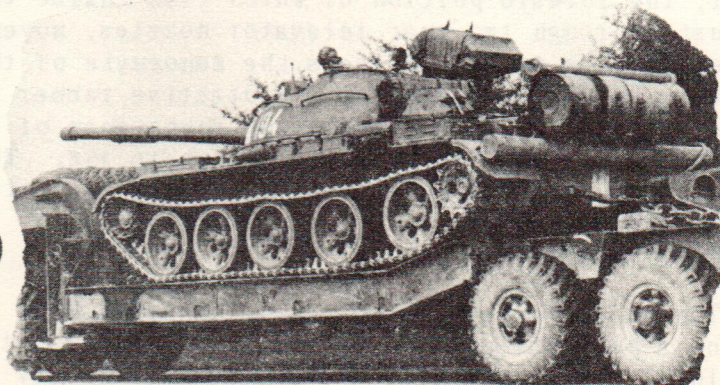


**Fig 4. CSSROT-64
SAGGER Carrier/
Launcher System**



Fig 5. Soviet BMP

**Fig 6. Soviet T-62
(Suspected optional fit)**



THE SAGGER MISSILE

Introduction

7. The missile was first paraded in 1965, although it may have been in service before this date. It is 0.88 m long (34.6 in), 120 mm (4.76 in) in diameter and weighs approximately 11.3 kg (25 lbs). (Some sources have given a heavier weight than this but the original estimate is still believed to be valid).

8. The missile employs Line of Sight command guidance over a wire link and has a maximum range of 3000m. The minimum range is 500 m and an Infantry Anti Tank Grenade Launcher RPG7 is usually carried with Soviet systems to engage targets that come within the 500 metre minimum range. This minimum range is largely dictated by the Safety and Arming mechanism of the warhead. The missile can be brought under control well before this distance by a skilled operator although, as will be seen later, much depends on the system employing the missile.

Control

9. The operator has no control over the missile during the boost phase. The missile is designed to climb during boost and then to follow a shallow downward path into the operator's narrow field of view during the initial part of the gathering phase. Because the missile is believed to be sensitive to the effects of ambient temperature it is required to be carefully elevated on its launcher to achieve this "coast effect" at the correct height above the ground.

10. Signals to the missile are transmitted down a fine multicore wire which is connected to the control unit via the missile firing cable. A pyrotechnic flare is fitted between the two upper fins. The operator's task of controlling the missile is far easier than on the older SNAPPER ATGW, which it replaces.

Motor Section

11. The missile has two solid propellant motors. The forward annular motor serves the booster system, which employs four mid-body nozzles. The rear motor, the forward portion of which fits inside the booster motor casing, exhausts through two rear jetavator nozzles, movement of which in response to the operator's demands effects the manoeuvre of the missile in flight. The nozzles, which are hidden by a protective rubber weather boot prior to launch, are assessed as swivelling downstream of the expansion chamber, which can result in an efficiency loss of up to 15%. The missile is believed to be roll rate stabilised and has an average velocity of 120 m per second.

Warhead Section

12. The standard warhead is of conventional HEAT design and is assessed as having a penetration of at least 400 mm (16 in) through armour. The warhead section can be removed from the motor section by two quick release catches. This allows the missile to be stowed in a relatively small carrying case in the man portable version. The Soviet designers are known to have taken advantage of this warhead quick release facility to produce warhead variants for SAGGER.

Construction

13. Much of the missile construction is of a light plastic (Soviet designation AG4). The four raked cruciform wings, also plastic, fold against the body for stowage and are each retained in the flight position by a spring loaded internal claw, which seats in the outboard section when released. This facility, again, allows for the neat stowage of the missile.

Nicknames

14. The Warsaw Pact operators are notoriously casual in their use of nicknames for SAGGER. Malyutka, Miss Ptrs, SS 10, 3M12 and even SCHMEL (normally attributed to SNAPPER) have been used in connection with this missile. The most frequently used nickname, and probably the correct one, is Malyutka (Little Baby).

Variants

15. SAGGER has now been in service for at least six years and there is little doubt that, following the Soviet in-service improvement philosophy, modified versions will have been produced. A recent report of one such version, referred to as SS11, is currently being investigated and will be the subject of a later article.

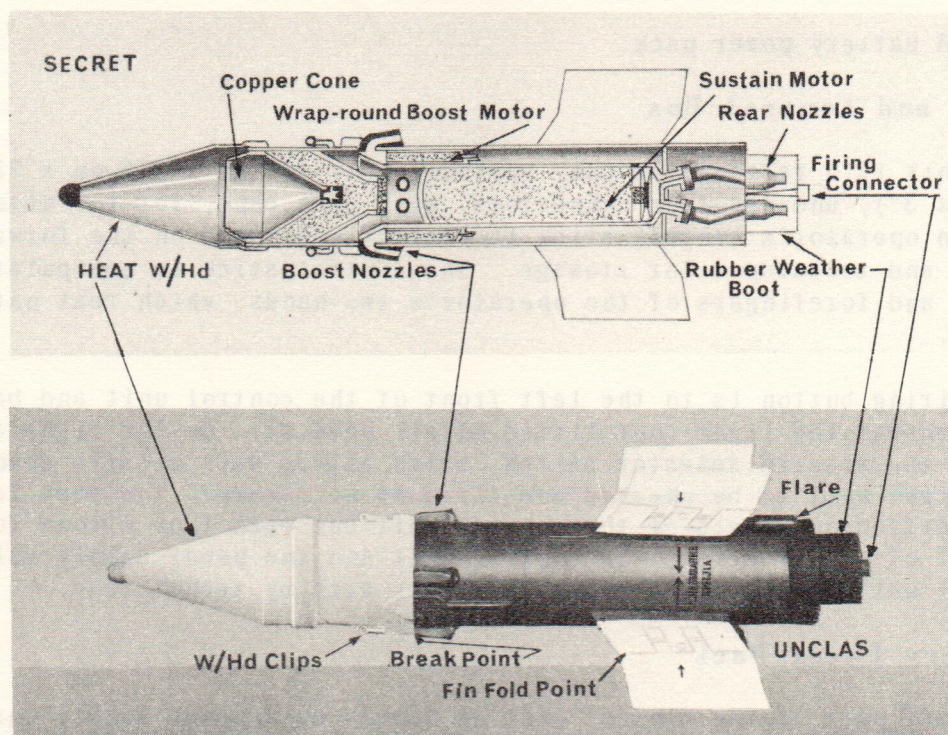


Fig 7. The Sagger Missile

16. At one stage it was believed that the missile on the Man Portable version and the missile on the BRDM were of different lengths. They are now assessed as being basically the same length with the possible exception of the East German Army BRDM mounted SAGGER which, despite the paraded version probably being only a drill round, is possibly some 10 cm longer than the versions seen elsewhere, and may relate to the reported "SS11". (See para 63).

THE SAGGER CONTROL UNITS

17. The various SAGGER systems include probably three basic control units. These are:

- a. The BRDM System Remote Control Unit.
- b. The Man Portable System Control Unit.
- c. The Onboard Control Unit for BRDM.

The Man Portable Control Unit

18. There is more than one model of this control unit in service. The main difference is in the layout and number of controls, and possibly the later models are designed for a simplified test sequence.

19. The control unit consists of the following basic items:

- a. A rectangular test and control box.
- b. An adjustable periscopic sight.
- c. A battery power pack.

The Test and Control Box

20. The unit is a rectangular box, approximately 460 mm x 275 mm x 75 mm (18" x 11" x 3"), and has four connectors, with dust caps, for the missile leads. The operator's control stick is centrally mounted on the forward half of the box and telescopes for stowage. The control stick is manipulated by the thumbs and forefingers of the operator's two hands, which rest naturally on the box.

21. The firing button is to the left front of the control unit and beside it is the check/warning light (not fitted on all models). On the right front of the box is the missile selector switch, which allows each missile connected to the control unit to be checked and fired as necessary. The test facilities vary with different models of the control unit but each type allows for a simple test of the missiles, the control unit and the power supply voltage. The control unit receives a thorough periodic test by technicians.

The Battery Power Pack

22. The rear part of the control unit is formed by a power supply box containing two rechargeable batteries which are sufficient for 50 firings. The operator's manuals are contained in a recess in the power supply box.

The Sight

23. The periscopic sight is mounted centrally on the control unit. It breaks into two sections for stowing in the control unit canvas carrying case. The erected sight is mounted on an adjustable bracket on the right centre of the control unit forward of the power supply unit. The mount allows for adjustment for height and azimuth, and the sight can be tilted in all directions. The mount is normally locked once the sight position has been adjusted.

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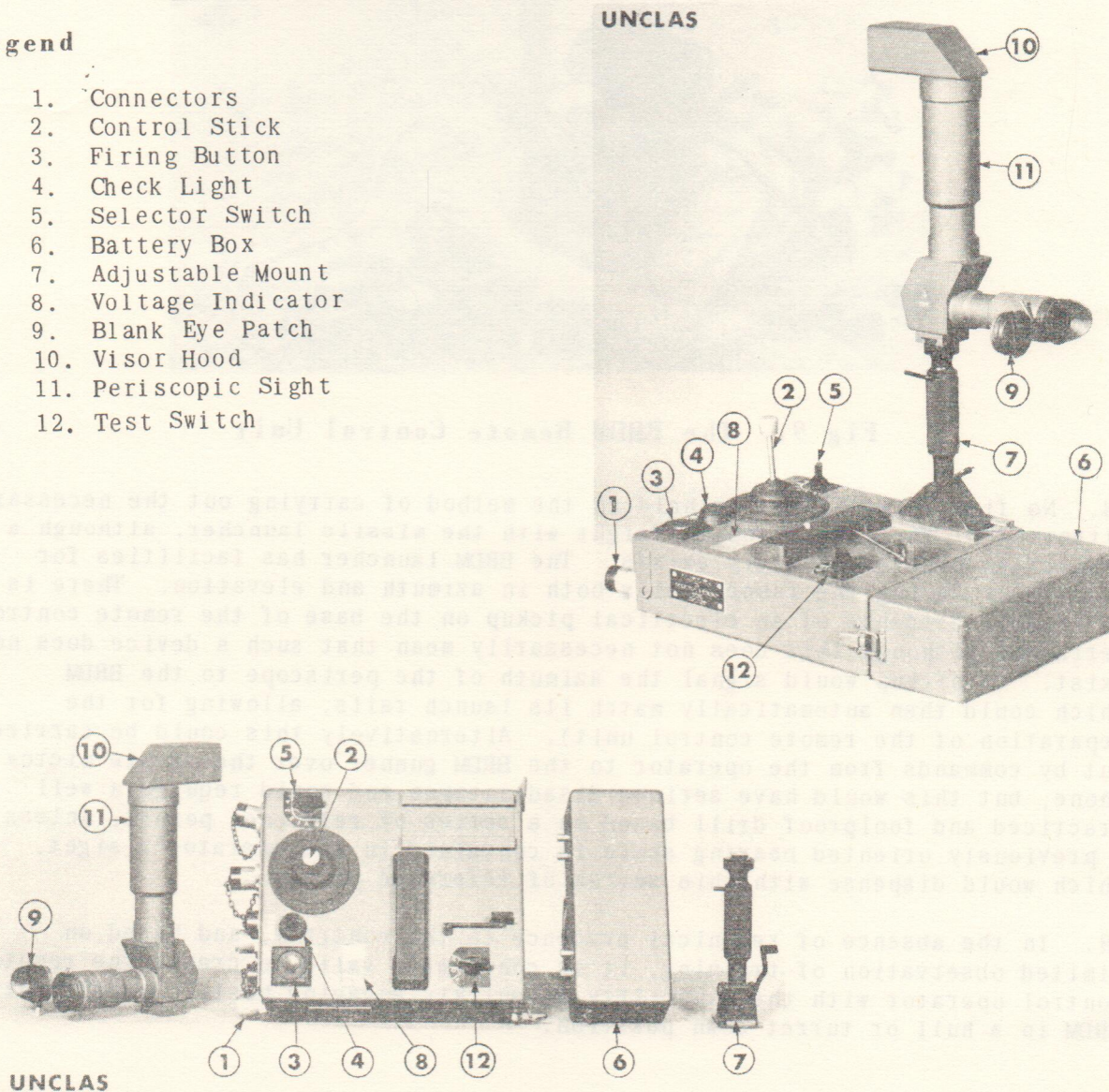
24. There is a small blank metal eye patch, which covers the operator's left eye, which is mounted beside the sighting eyepiece. The lens has adjustable focus and approximately x 10 magnification. There are different types of graticule for the various models, the more usual being a series of concentric rings cut by a central cross wire. One type includes a simple stadia device, similar to Vigilant.

25. The periscopic sight has a visor hood which incorporates at least two optional filters, one being for bright conditions and the other, a blue filter, for conditions of fog or haze. The control unit sight appears to have one serious disadvantage in that there is no x 1 gathering optic which, in Western eyes, imposes an unnecessary constraint on the operator and requires the missile to be sited so that it is aligned with the remote control unit in order that it is certain to fly into the operator's fixed line of vision. Horizontal separation is limited to no more than 15 metres.

**Fig 8. The Man Portable
Control Unit
(Demonstration Model)**

Legend

1. Connectors
2. Control Stick
3. Firing Button
4. Check Light
5. Selector Switch
6. Battery Box
7. Adjustable Mount
8. Voltage Indicator
9. Blank Eye Patch
10. Visor Hood
11. Periscopic Sight
12. Test Switch



The BRDM Remote Control Unit

26. The BRDM Remote Control Unit is similar to the Man Portable Control Unit. The box is smaller and apparently does not require a battery box on the rear. Power is presumably provided from the BRDM. The four missile cables of the Man Portable unit are replaced by one large cable which leads to the BRDM launcher. The control unit appears to have little or no test facilities.

27. The horizontal separation capability is assessed as approximately 25-30 m. Again there is no evidence of a gathering optic on the sight and this is a surprising restriction on the flexibility of the system. The separation cable probably embodies a speech line for communication with the vehicle.



Fig 9. The BRDM Remote Control Unit

28. No firm intelligence is held on the method of carrying out the necessary alignment of the remote control sight with the missile launcher, although a separation plotter probably exists. The BRDM launcher has facilities for accurately laying the launch rails both in azimuth and elevation. There is no visible evidence of an electrical pickup on the base of the remote control periscope although this does not necessarily mean that such a device does not exist. (A pickup would signal the azimuth of the periscope to the BRDM which could then automatically match its launch rails, allowing for the separation of the remote control unit). Alternatively this could be carried out by commands from the operator to the BRDM gunner over the remote microphone, but this would have serious disadvantages and would require a well practiced and foolproof drill based on a series of reference points, unless a previously oriented bearing scale is contained in the operator's sight, which would dispense with this series of reference points.

29. In the absence of technical evidence to the contrary, and based on limited observation of training, it is considered valid to credit the remote control operator with the capability of quickly engaging hostile targets with BRDM in a hull or turret down position.

The On Board BRDM Vehicle Control Unit

30. This unit is a far more complex equipment than the remote system and is housed between the commander's hatch and the driver's hatch. In the travelling position it is stowed against the roof and swings down through 90° to the firing position. The sight hatch opens automatically at the same time.

31. The eyepiece of the sight appears to be binocular. The control stick is identical to the remote unit and the launcher rails are probably slaved to the sight.

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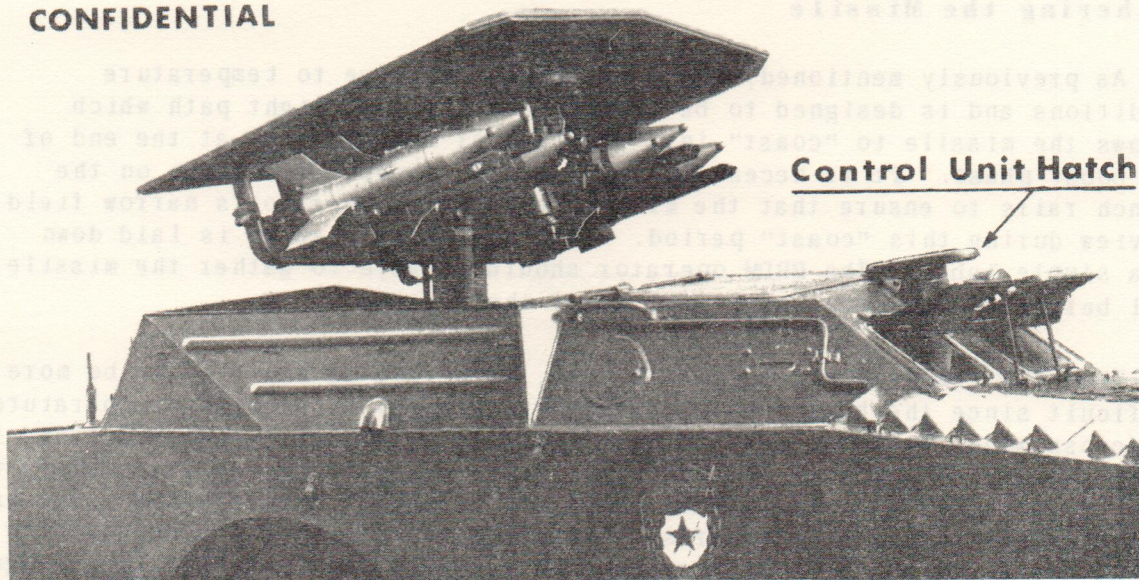


Fig 10. The BRDM SAGGER Sight

THE SAGGER BRDM MOUNTED ANTI TANK SYSTEM

Description

32. The BRDM system is based on a modified BRDM vehicle, which retains its cross-country and amphibious performance. The system has six SAGGER missiles fitted on launch rails and carries eight reserve missiles stowed in ready racks.

33. The six launch rails are fixed below a rectangular hatch, which elevates on a central column to the firing position. When the hatch is lowered it seals with the body of the BRDM, affording protection for the missiles. The BRDM can travel with the launch rails in the firing position.

34. The six launch rails can elevate and depress as well as traverse some 90° either side of the vehicle centre line. Adjustment for vehicle tilt is believed to exist. (Elevation, and to a lesser degree tilt, adjustment is necessary for gathering the missile). (See para 9).

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35. The missiles are secured to the launch rails by small spring loaded L-shaped clips at the front of the two lower wing roots. These clips secure round the upper lip of the launch rail. The rear of the missile is protected and secured by a circular metal boot which is open at either end and fixed to the launch rail. The rear of the missile extends through this protective boot to contact the fixed firing connectors behind each rail.

36. The BRDM on-board sight and control unit is situated in between the two forward hatches. The sight is normally protected by a steel hatch which elevates when the sight is required. The sight is believed to be ganged to the launch rails.

37. The BRDM system includes a remote control unit which is discussed in para 26.

Gathering the Missile

38. As previously mentioned, the missile is sensitive to temperature conditions and is designed to be launched on a fixed flight path which allows the missile to "coast" into the view of the operator at the end of the boost phase. It is necessary to place the correct elevation on the launch rails to ensure that the missile enters the operator's narrow field of view during this "coast" period. This correct elevation is laid down in a simple table. The BRDM operator should be able to gather the missile well before the minimum range (500 m) of the missile.

39. When the remote control unit is used, gathering is expected to be more difficult since the horizontal separation, vertical separation, temperature and cross-winds will all have to be allowed for. Under these conditions it is possible that the full 500 m minimum range may well be required before the missile is gathered by the remote operator. Although this minimum range is long by current Western standards it was probably originally acceptable to Soviet designers as their ATGW systems were considered to be the long range element of the overall anti tank defences. However, it is believed that this long minimum range will soon become unacceptable to Soviet users and efforts will be made to reduce it.

THE SAGGER ATGW IN SOVIET BMP

Description

40. The SAGGER is an integral part of the armament of BMP seen on parades, although in combat probably only one BMP in four is likely to carry SAGGER. A missile launch attachment is fitted above the gun, which allows the launch rail to be traversed and elevated as required. The missile, complete with its launch rail is loaded through the central loading hatch and fitted to the launcher bracket. There is no firm evidence to show whether the operator's control unit and sight is similar to the BRDM fixed unit or the Man Portable Control Unit. It is probably the latter. Gathering conditions will be similar to the BRDM system.

BMP

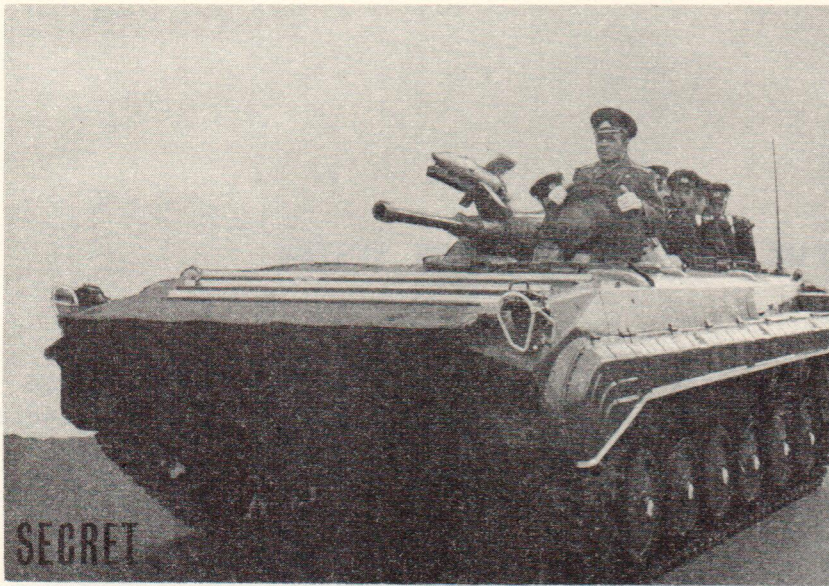


Fig 11.
SAGGER Launch
Rail. (Front View)

Fig 12.
SAGGER Launch
Rail. (Side View)

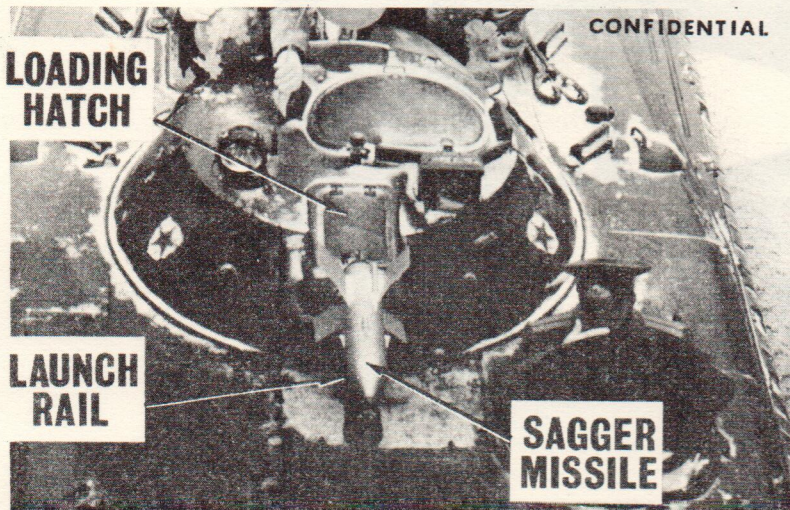
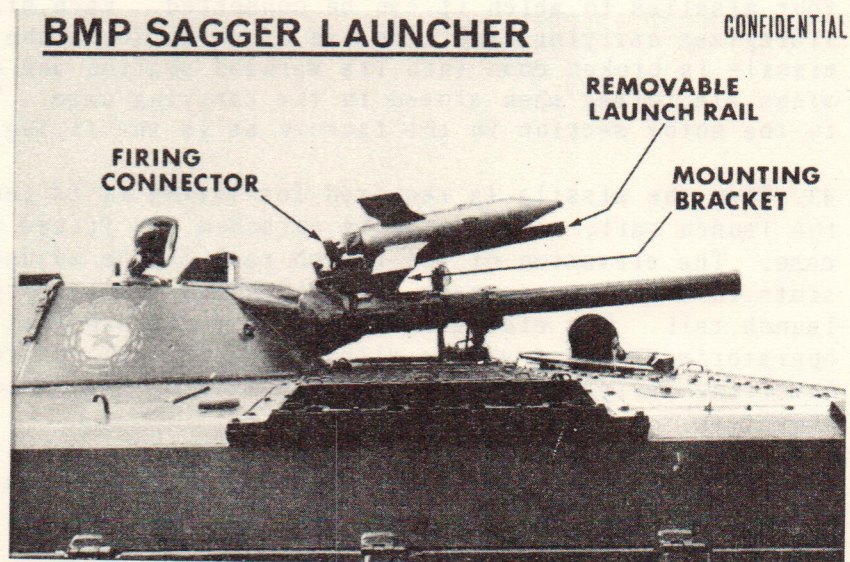


Fig 13.
SAGGER
Overhead View

THE MAN PORTABLE SAGGER ANTI TANK SYSTEM

Description

41. The relatively light weight of the missile and its compactness has allowed the Soviets to produce a truly man portable version of SAGGER. The man portable SAGGER anti tank system is found in Motor Rifle Infantry and Airborne units, and as a battalion weapon at least in Czechoslovakia, form anti tank batteries. These anti tank batteries usually consist of SAGGER squads each of one NCO launcher/operator, one assistant gunner and one RPG 7 gunner. In some types of unit there is also an NCO Squad Leader or an additional assistant gunner.

42. The system consists of the control unit described in para 18 and up to four missiles to which it can be connected. Each missile is transported in a fibreglass carrying case, the lid of which forms the base of the launcher. The missile is broken down into its warhead section and motor section and the wings are folded when stowed in the carrying case. The launch rail is fitted to the motor section in the factory as is the firing connector.

43. When the missile is required for firing it is removed from its case, and the launch rail, to which it is attached, is fitted to the lid of the carrying case. The elevation of the launch rail can be adjusted by choosing different slots in the carrying case lid into which fit the front support legs of the launch rail. The elevation is chosen to ensure that the missile enters the operator's field of vision without any initial control from the operator. A levelling device on the side of the launch rail is used to check this elevation.

44. The warhead is fitted after the motor section has been erected.

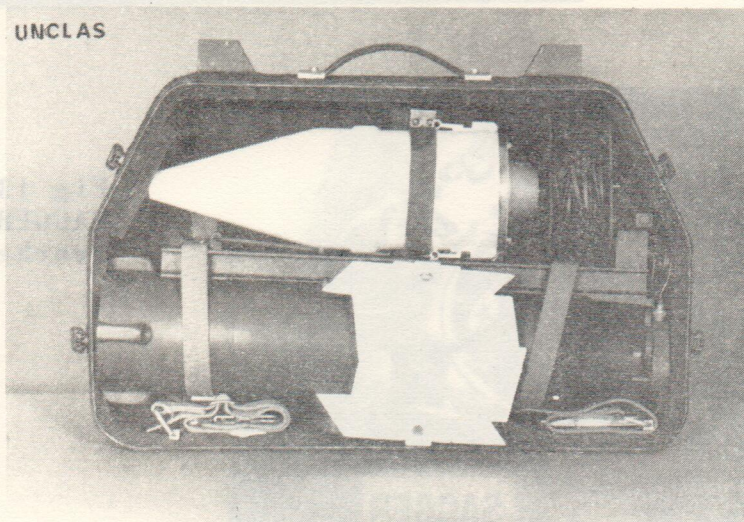


Fig 14. Man Portable SAGGER stowed in Carrying Case

45. The missile is placed close to the operator (3-15 m) and is lined up on the target on which the operator has fixed his sights. The launcher is secured to stakes in the ground with straps, front and rear. When the missile is connected to the control unit by the firing cable, a simple continuity test is carried out by the operator, and the target engaged on the orders of the commander.

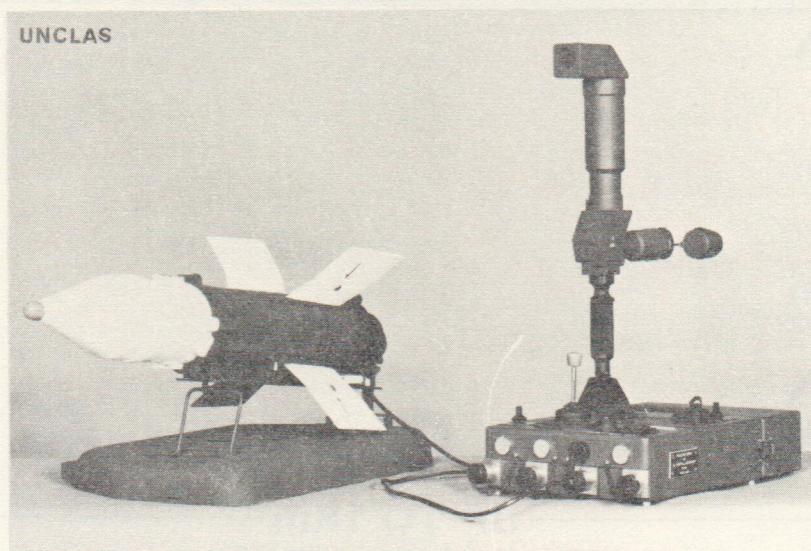


Fig 15. The Man Portable SAGGER System

46. A drill for setting up the system and engaging targets is shown in para 50.

47. Different deployments can be used by a man portable SAGGER squad or battery depending on the tactical situation. (See Figs 16 and 17)

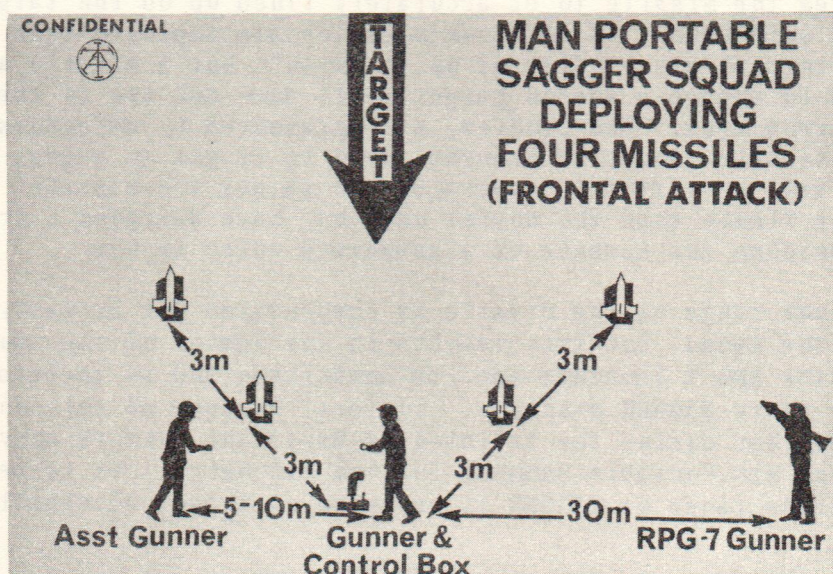


Fig 16. SAGGER Squad (Frontal Attack)

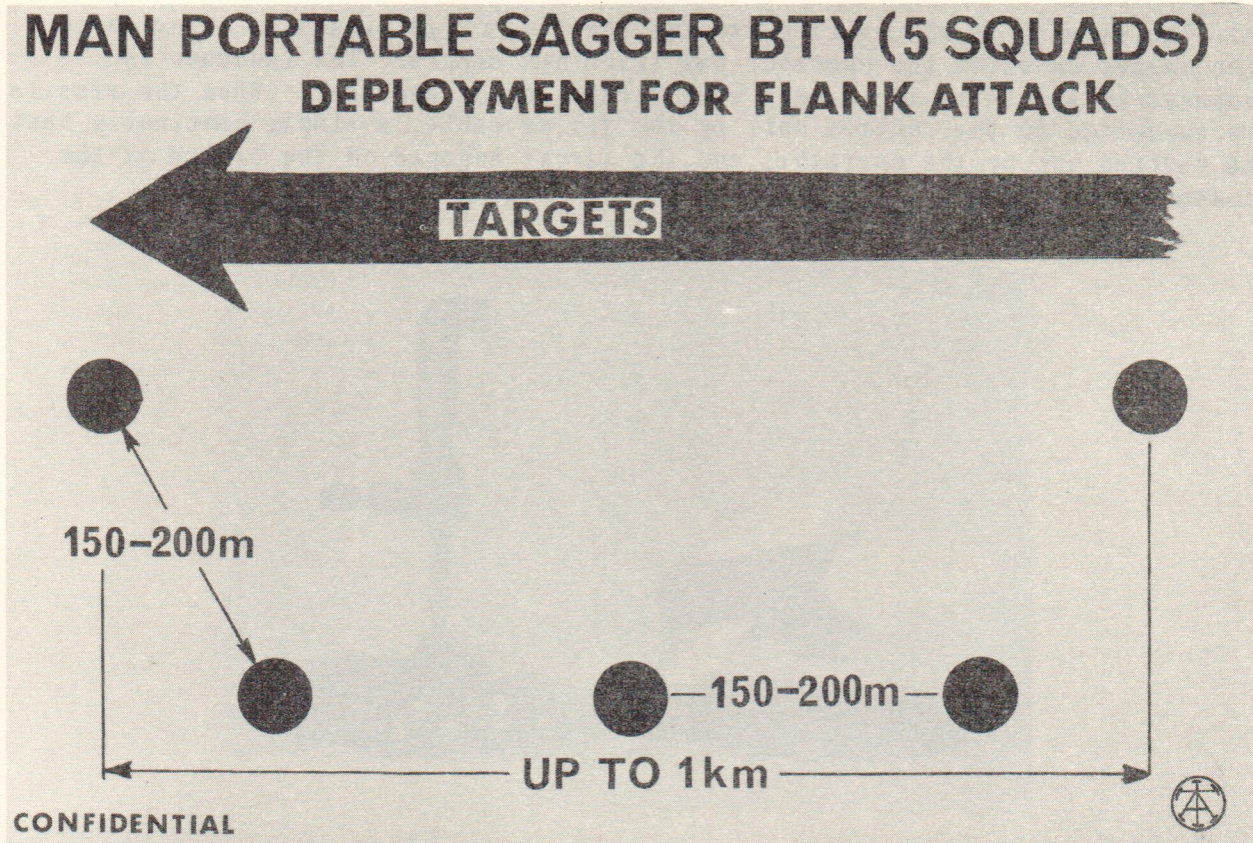


Fig 17. SAGGER Battery (Flank Attack)

System Disadvantages

48. The system has several shortcomings, when reviewed through Western eyes. The missiles, which cannot be hidden, have very little separation from the operator as the missile apparently has to be sited close to the operator to ensure that he can gather it in his sight. This makes the operator vulnerable to counterfire. The absence on current control unit sights of a gathering optic requires the missile to be accurately lined up on the target immediately after target selection. If all four missiles are deployed then the operator can have an initial arc of fire of up to 30-40°, but a missile will have to be realigned to engage a second target if it does not lie in the remaining missiles' narrow arcs. The problem, as represented by defectors, is not so much that a missile cannot be brought round in flight to engage the target but that it will be virtually impossible to gather the missile. It is, of course, quite likely that the Soviet user may have designed a drill to partially overcome the absence of a gathering optic by now.

49. The minimum range of the missile is compensated for by carrying an RPG 7 launcher in the squad, but this results in one member of the squad being loaded with the RPG 7 launcher and its ammunition and is therefore not available to carry SAGGER missiles. In fact, because of this, one recent source stated that during the training of Assistant Gunners they were trained to carry three Man Portable SAGGERS for one kilometre. It is believed that the long minimum range of SAGGER is becoming no longer acceptable to the Soviet user.

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Sample Deployment Drill

50. A drill, reported in current use in Czech SAGGER Batteries, is shown below.

The Battery Commander will have previously assessed the tactical situation and decided on the deployment to be used. In this case it will be one launcher per squad. He will have also selected the general area for each squad.

51. The squad in this drill consists of three men. An NCO gunner (launcher/operator), an assistant gunner, and an RPG 7 gunner. The OT 64 launcher/carriers, which carried the personnel and equipment will have been deployed under cover to the rear and will take no further part in the action. The targets are already visible.

Gunner	Asst Gunner	RPG 7 Gunner
Orders action and indicates target	Identifies target	Takes up position 30 m to the right flank of launcher. Readies RPG 7.
Moves to position of available cover and unpacks control unit	Selects suitable position for launcher approx 5 m to the right of the gunner.	
Assembles periscopic sight and inserts it into the mounting bracket. Attaches light filter if required	Opens carrying case; places lid on ground and lines up on target	Covers dead zone caused by 500 m minimum range of SAGGER

Continued on pages 42 - 43

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cont' d

Gunner	Asst Gunner	RPG 7 Gunner
	Removes two securing stakes and straps from carrying case. Places stakes to front and rear of lid and secures straps to it.	
Checks battery pack is secure. Switches power to ON and reads voltmeter. (Voltage should read in red field for firing).	Removes motor section, with launch rail attached. Inspects and places launch rail on pad. Inserts rear (fixed) launch rail mounting into pad.	
Operates control box circuit test switch (if fitted).	Sets elevation ordered on elevating level. Places front (adjustable) feet into correct hole to centre levelling bubble.	
Elevates control stick and checks for free play.		
	Removes warhead from carrying case. Removes safety shorting plug and mates warhead to motor section using the two snap catches.	

Continued on page 43

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cont' d

Gunner	Asst Gunner	RPG 7 Gunner
Removes dust cap from No 1 missile connector. Stows dust cap on housing.	Unfolds fins and locks in position Attaches Firing Cable.	
Connects firing cable plug to No 1 missile socket.	Checks firing connector for security. Unreels firing cable and takes to gunner.	
Carries out continuity test by switching missile selection switch to No 1 and noting fluctuation on voltmeter or illumination of test lamp (test lamp models only).	Takes up position to left of gunner.	
Switches selector/test switch to OFF position (if fitted). Reports ready.		
Receives order "FIRE". Presses firing button, waits for missile flare to appear in his sight (normally top right-hand corner) and guides missile onto target.		
Reports "TARGET DESTROYED" or "TARGET NOT DESTROYED" as applicable.		

POSSIBLE SAGGER MOUNT ON T-62

52. Several Soviet T-62 tanks, which were returning from the invasion of Czechoslovakia, were observed to have small box-shaped attachments on the rear of their turrets. Dimensioning of these attachments showed that they were the correct size to contain two SAGGER missiles on launch rails. The "angle of elevation" of the attachments was suitable for a SAGGER launch. No further sightings of such a device have been made, but it is believed that the Soviets could well have fitted SAGGER to some tanks in order to increase the range of the tank armament. The necessary fixed alignment of the missiles with the gunner's sight would allow for considerable flexibility in azimuth, as the turret traverses. It is believed that some means of elevation adjustment would be necessary for such an attachment, for the gathering of the missile.

YUGOSLAV AR 51 (SAGGER CARRIER)

53. Yugoslav AR 51 have been paraded carrying two man portable SAGGER launchers on the rear of the vehicle. It is believed that this is largely a parade device and that the man portable SAGGER squad would be unlikely to fire from this position, and would use the normal deployment techniques instead.

CZECH OT-64 SAGGER CARRIER/LAUNCHER

54. Czech OT-64s fitted with two man portable SAGGER missiles were recently paraded in Prague.

55. The missiles can be fired from the OT-64, although the fixed pad would not have the flexibility of a missile system attached to a traversable turret such as in BMP, BRDM or (possible) T-62.

56. The OT-64 carries a man portable SAGGER squad, its equipment and missiles. A special missile periscopic sight is fitted to the OT-64 for use with a vehicle launched SAGGER missile, and the control unit box (without sight) is fitted into a special bracket attachment in front of the gunner's seat.

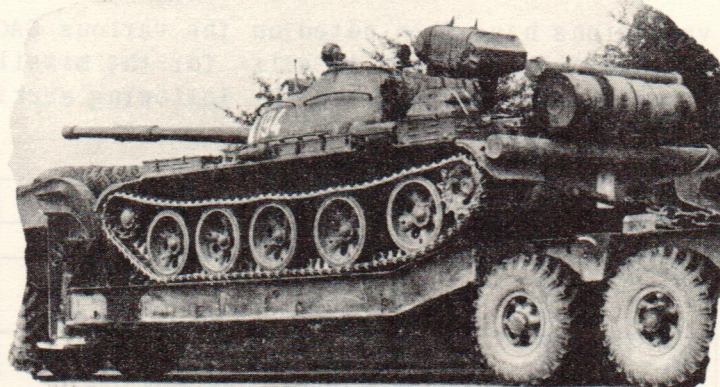


Fig 18. T-62 with Possible SAGGER Mount



Fig 19. Yugoslav AR-51 SAGGER Carrier

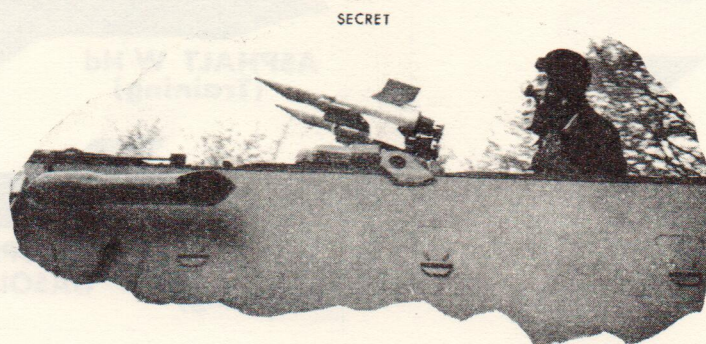


Fig 20. Czech OT-64 SAGGER Carrier/Launcher

SAGGER WARHEAD VARIANTS

57. Several minor variations have been noted on the various SAGGER missiles paraded, and warhead variants are known to exist for the missile. A recently received, but unconfirmed, report has given the following markings of missiles used in Czechoslovakia.

Type	W/Hd	Fuse	Body	Wings	Other Markings
Mockup	Silver	Black	Silver	Silver	'MAKETA' on Body
Light Smoke	"	"	"	"	Two White Bands Half Wing Black (One side only)
Black Smoke	"	"	"	"	Two Black Bands Half Wing Black (Both sides)
Unknown W/Hd	"	Silver	"	"	Two Black Diagonal Bands Wings Black (One side only)
Live	Red	Red	"	"	Two Red Bands
Asphalt W/Hd	Black	Black	Black	Black	_____
Asphalt and Gasoline W/Hd	Silver	Silver	Black	_____	Wings Half Silver Half Black (Both sides)

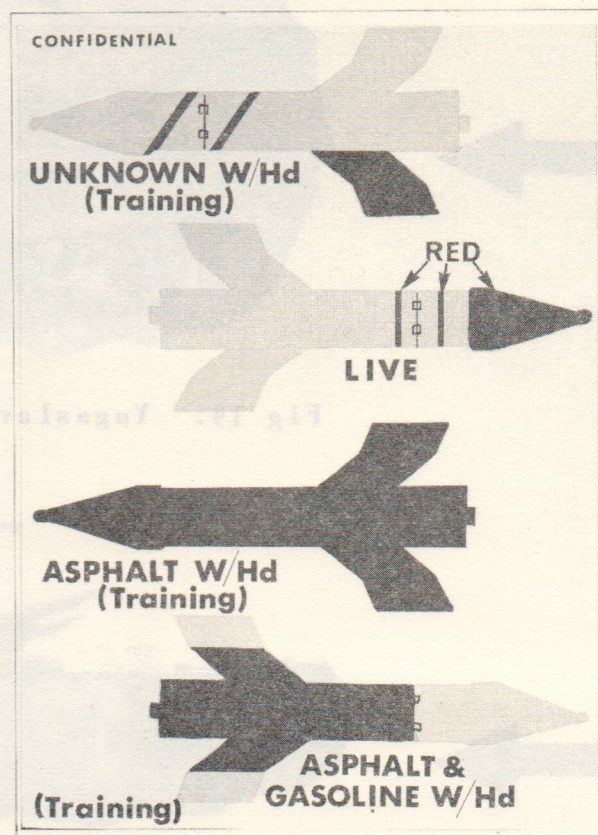
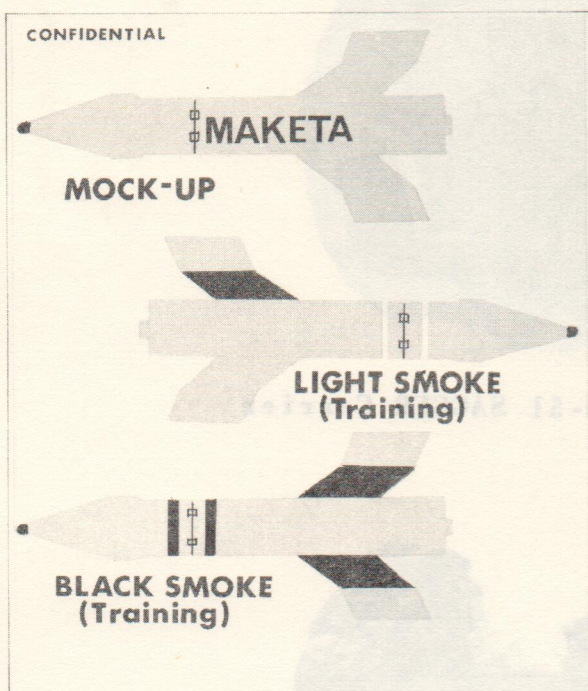


Fig 21. SAGGER Warhead Variants

TRAINING OF OPERATORS

58. SAGGER personnel undergo lengthy and thorough training on their equipment. They are given a comprehensive understanding of the missile and its components, and spend many hours on the missile simulator. Assistant gunners who show promise on their initial training are selected for a 3-month Senior Gunners Course and are promoted on successful completion of the course.

A Training Simulator

59. A considerable amount of time is spent on the missile simulator. This is usually housed in a ZIL-157 simulator trainer van (USAREUR Box Body Handbook Vehicle No 125). After initial practice in controlling an illuminated dot through a series of mazes the operator proceeds on to controlling a simulated missile flare onto a series of targets under varying conditions. The behaviour of the missile under different temperature conditions can be programmed into the simulator.



Fig. 22 SAGGER
Simulator/ Trainer Van



60. The simulator can be used in field training, in which case power is provided by a remote generator. A hatch in the front of the vehicle can be opened so that the operator can observe live targets through his sight.

61. It is believed that recent modifications to the SAGGER missile may have allowed the Soviets to relax their stringent operator selection and training requirements.

SAGGER IN THE ANTI HELICOPTER ROLE

62. The man portable SAGGER system has been reported as having some limited anti helicopter capability, and this would be in keeping with the Soviet philosophy of engaging enemy aircraft with all suitable means. However, the system would have several severe limitations in this role. The sighting device is designed with a narrow field of view to engage AFVs, which have little manoeuvrability compared with a helicopter. Even if the operator could track a helicopter through his sight it is unlikely that the missile

could chase a manoeuvring helicopter. However there is a distinct possibility that a hovering helicopter, or one that presented a near stationary target, could well invite attention from a SAGGER missile. The helicopter pilot would probably have little trouble in taking successful evasive action, if aware of the attack.

THE "SS 11" SAGGER

63. A recent defector has stated that his unit was equipped with a modified SAGGER missile nicknamed SS11. The missile is referred to as having the same range as the normal SAGGER, but has a modified internal layout which has resulted in better accuracy and reliability as well as improved ease of control. If such a missile exists it is expected to be some 10 cm longer than the normal SAGGER. If the additional length is to the rear of the fins then the missile could well have to be moved forward on the BRDM launch rail in a similar fashion to the East German Army drill round SAGGER seen on parades in East Berlin.

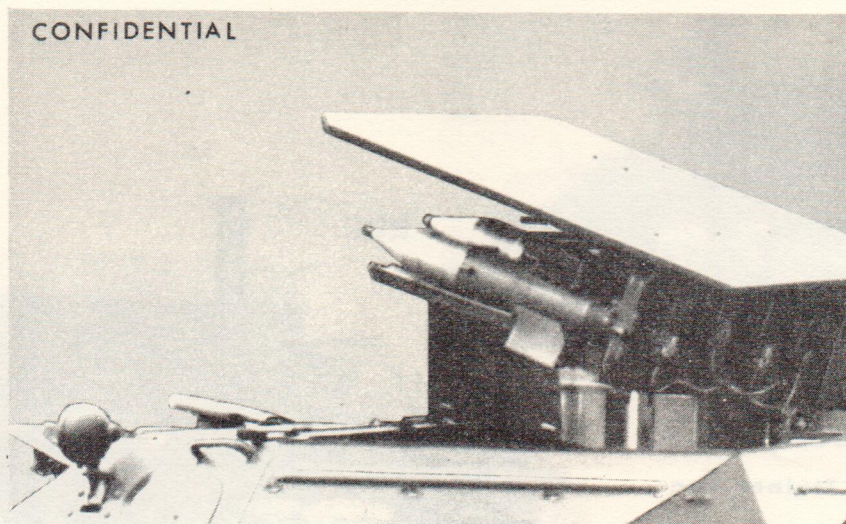


Fig 23. The East German Army SAGGER Drill Round

Naming of SAGGER Missile Variants

64. SAGGER Missile variants can be expected and may already be in service. In order to distinguish between the present standard SAGGER and subsequent versions, it is proposed that the standard SAGGER will be referred to as SAGGER 'A' in future. Nicknames (SAGGER 'B', SAGGER 'C', etc) for variants will be reported as they are agreed.

SAGGER Production

65. It is considered likely that SAGGER production will continue until about 1975, although it may well undergo a series of modifications. It is doubtful if the last SAGGER will go out of service much before 1980, although the replacement for the BRDM SAGGER, which should incorporate a Soviet second generation missile, is anticipated well before this.

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BRDM MOUNTED SAGGER 'A' ANTI-TANK SYSTEM

**System
Designation**

UK AT-3
SOVIET ---

**Missile
Nickname**

NATO SAGGER 'A'
SOVIET MALYUTKA (Little Baby) or SS10

System Function

Anti-Tank Guided Missile System

System Description

The system consists of six SAGGER 'A' missiles on a modified BRDM Armoured Reconnaissance vehicle, which remains amphibious. The six missiles are carried under launch rails, which are elevated for firing. The roof elevates with the rails and remains above during the firing. The launch rail group has at least 90° traverse left and right. A reserve of eight ready missiles is carried in the launch vehicle.

The operator flies the missile on to the line of sight of the target as soon as the missile is subject to control. A high standard of operator is required and a simulator van for continuous training is held by units. The missile can be controlled either from inside the BRDM using the specially mounted sight, or by the remote control unit. Soviet ATGM are usually deployed in mutual support with anti-tank guns.

**Missile
Performance and
Characteristics**

The SAGGER 'A' missile is in two sections joined together by quick action catches. This facility of stowing the warhead section and motor separately is used only in the Man Portable SAGGER 'A' System. Minor changes noted on SAGGER 'A' missiles since 1965 may well be due to a settling of design, discarding the break down facility on the BRDM Mounted SAGGER 'A' and internal changes in warheads, to include warhead variants, although recently reports have been received of a missile which incorporates major internal redesign features. The performance of SAGGER is a considerable improvement on that of SNAPPER.

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a. Range	500-3000 m
b. Accuracy	Better than 1 m
c. Penetration	400 mm (16 in)
d. Time of Flight	Approx 25 seconds
e. Mean velocity	120 m/s
f. Length	Approx 0.88 m (34.6 in)
g. Diameter	0.120 m (4.76 in)
h. Launch Weight	Approx 11.3 kg (25 lb)
j. Propulsion	Two solid propellant motors. 2 rear jetavators plus 4 fixed mid-body boost nozzles.
k. Warhead	HEAT. 110 mm Cone diameter. 2.7 kg (6 lbs)
l. Fuze	Piezo-electric impact with self destruct
m. Guidance	Manual line of sight command, wire link
n. Control	Jetavator Roll rate stabilised.
o. Reaction Time	10 seconds
p. Refire Time	5 seconds
q. Reload Time	Estimated 5 minutes

Status

SAGGER is the replacement for SNAPPER and has been exported to several Warsaw Pact countries. BRDM Mounted SAGGER is currently a Regimental ATGM in the Motor Rifle Division, and the Regimental and Divisional ATGM in the Airborne Divisions.

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MAN PORTABLE SAGGER 'A' ANTI-TANK SYSTEM

**System
Designation**

UK AT-3
Soviet ---

**Missile
Nickname**

NATO SAGGER 'A'
SOVIET MALYUTKA (Little Baby) or SS10

System Function

Man Portable Anti-Tank Guided Missile System

**System Description
and Operation**

The system consists of four SAGGER 'A' missiles and a control unit. The SAGGER 'A' missiles are broken down into warhead section and motor section and carried in a fibre-glass container, the lid of which is used as part of the launch ramp. The missile fins fold. The control unit is similar to the BRDM Mounted SAGGER 'A' remote control unit.

When the system is deployed, the missiles are removed from their carrying containers, assembled and placed on the container ramps which are staked to the ground. The control unit is then connected to up to four missiles, depending on the tactical situation. A high standard of operator is required and a simulator van for continuous training is held by units. The system can be carried or fitted on any vehicle and so far has been seen on OT 64, and AR 51. There is no technical reason why it should not be fitted to Soviet helicopters if the requirement existed.

The system could have some limited effect as a self defence weapon against a low flying slow moving helicopter, but the fixed optical periscope would hamper the operator considerably.

**Missile Performance
and Characteristics**

Minor changes have been noted on SAGGER 'A' missiles since 1965. These could be due to settling of design, manufacture by different countries and warhead variants, both training and combat, although recently reports have been received of a missile which incorporates major internal redesign features.

SECRET
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a. Range	500-3000 m
b. Accuracy	Better than 1 m
c. Penetration	400 mm (16 in)
d. Time of Flight	Approx 25 seconds
e. Mean velocity	120 m/s
f. Length	0.88 m (34.6 in)
g. Diameter	0.120 m (4.76 in)
h. Launch Weight	Approx 11.3 kg (25 lb)
j. Propulsion	Two solid propellant motors. 2 rear sustain jetavators plus 4 fixed mid body boost nozzles
k. Warhead	HEAT. 110 mm cone diameter 2.7 kg (6 lb)
l. Fuzing	Piezo-electric impact with self destruct
m. Guidance	Manual Line of Sight command, wire link
n. Control	Jetavator. Role rate stabilised
o. Reaction Time	10 seconds
p. Refire Time	5 seconds, if next missile is set up
q. Reload Time	Estimated 1 minute to erect each further missile

Status

Man Portable SAGGER is primarily an infantry weapon in Motor Rifle and Airborne Divisions. It is a popular weapon to fit as an ad hoc arrangement on vehicles in Non Soviet Warsaw Pact Countries. Some Soviet T 62 Tanks have been sighted with a possible SAGGER launcher as a turret attachment.